

## SHOWER DRAINAGE

[0001] This invention relates to shower drainage. In particular it relates to drainage from showers that require pumping to drain water from the shower. The invention is also applicable to showers constructed using wet floor formers.

[0002] In conventional showers, water drains under the effect of gravity. This can occur because the base of the installation is formed from a tray that is typically mounted slightly above floor level and has a rim formed around its periphery to retain water while it drains from the base through a drain hole.

[0003] There are certain cases in which it is difficult or impossible to locate the shower tray sufficiently above the drain for gravity to cause water to flow properly into the drain. Access to a conventional installation can require a step up from floor level to enter the shower. Even though this step might be relatively small, it can still represent a major hindrance to people with physical disabilities, the old-aged or wheelchair bound, for whom the step up is either very difficult or, in some cases, impossible. In order to accommodate such people, it is desirable to mount the shower tray as close to floor level as possible, possibly flush with floor level. However, when this is done, it can be difficult to obtain sufficient vertical separation between the shower tray and the drain to achieve effective gravity drainage. Similar problems occur with wet floor bathrooms when the floor is gently sloped to a drain by grading the floor or by installing a Wet Floor Former. In such an installation, all or part of the floor of the room is covered with a waterproof covering and the floor under the covering slopes down to a drain. Such a floor is created by using a wet floor former: a structural former, typically made from glass reinforced plastic, metal or other such materials which defines the shape of the wet floor, in particular the fall towards the drain hole, and over which the waterproof covering is laid. Low level trays are also becoming popular for general applications in the domestic market, irrespective of the ability of the user.

[0004] One solution to the problem of difficult drainage by gravity is to fit a pump to the waste outlet from the shower to pump waste water into the drain at a rate sufficient to prevent the shower tray from filling with water. Examples of pumped waste systems for showers can be found in GB 1,532,953; GB 2,224,777; GB 2,276,541; GB 2,288,116; GB 2,294,636; GB 2,361,429 and GB 2,373,515.

[0005] GB 2,276,541 and GB 2,294,636 describe shower trays which have a recess into which water flows. An electric pump is located above the shower tray and sucks water from the recess by means of a pipe which projects into the recess from above. GB 1,532,953; GB 2,224,777; GB 2,288,116; GB 2,294,636; GB 2,361,429 and GB 2,373,515 describe shower trays with a waste outlet through which water drains into a sump (chamber or gully trap), the water again being sucked therefrom through a pipe connected to an electric pump.

[0006] GB 2,373,515 describes a floor drain for a shower which includes a wet floor former for supporting a water resistant floor covering material, the former comprising a base having a predetermined fall, and a trap towards which the fall is directed, the trap comprising a sump which is provided on the base, a shower water inlet through which water from the floor covering material can enter the sump, a waste water outlet, a pump for causing at least a portion of the said water to flow from the sump through the waste water outlet, and a clamp which surrounds the shower water inlet and by which the floor covering material can be clamped to the base. The pump is located incorporated into the waste water outlet (discharge pipe).

[0007] These systems suffer from a number of problems. A typical electrically heated shower can deliver water at 6-8 litres/minute. In order that the shower should not fill up and flood the room in which it is located, the pump must remove water at a rate no less than this and so the pump is typically rated at around 10-12 litres/minute. Such pumps are large, making it difficult to locate the pump below the shower tray. They are also noisy. As the pump draws at a rate greater than the water flows from the shower, it will also draw a large amount of air through the drainage

system. This can lead to air locks forming in the system, preventing effective drainage, and causes more noise.

[0008] GB 2,224,777 proposes providing a sump below the shower tray and operating the pump only when sufficient water has entered the sump to activate an operating switch. In order to avoid the pump continuously switching on and off, it is necessary that the sump is relatively large and that there is a delay between the water level dropping low enough to deactivate the pump and the pump actually stopping. This makes installation difficult and can lead to oscillation when the shower is stopped as water draining back from the pump when it stops can be sufficient to reactivate the pump. The water draining out of the pump can still cause air lock problems. It has been proposed to mount the pump in the sump itself. However, the large physical size of the pump means that this can be difficult to install if there is limited vertical space available below the shower tray. The pump is also vulnerable to blockage by hair or the like, a problem common to most existing pumped-outlet shower systems.

[0009] It is an object of this invention to provide a pumped-outlet shower which does not suffer from some or all of these problems.

[0010] It is another object of this invention to provide a wet floor former for creating a shower installation that can be supplied with a pump to assist drainage which does not suffer from some or all of these problems.

[0011] This invention attempts to address these problems by positioning a pump in the shower tray drain outlet or the wet floor former so that the tray drains directly into the pump chamber.

[0012] A pump according to the invention comprises a pump chamber having an inlet for receiving water from the shower base and an outlet through which the water is pumped; characterised in that the inlet can be connected to the shower base such that the water drains directly into the pump chamber from the shower base.

[0013] The pump can have a motor mounted above or below the pump chamber. There can also be a filter cover mounted above the pump

chamber to prevent blockage of the chamber. Where the motor is located above the pump chamber, it can be positioned so as to be entirely below the cover.

[0014] By positioning the pump chamber to receive water from the shower directly, the problems associated with the need to suck water from a sump are avoided. Thus the pump can be of lower power and problems of air locks are reduced. The preferred form of pump is a Centrifugal pump, although other forms of pump can also be used with the same benefits. The motor is mounted above the chamber, and drives the impeller by means of a drive shaft which passes through the shower drain outlet.

[0015] This pump can be used in a shower tray arrangement, with the pump chamber being optionally formed integrally with the shower tray, or in a wet-floor former in which a waterproof upper layer on the former is clamped to the pump.

[0016] The invention also comprises a wet floor former for supporting a water resistant floor covering material, the former comprising a base having a predetermined fall, and a trap towards which the fall is directed, the trap comprising a sump which is provided on the base, a shower water inlet through which water from the floor covering material can enter the sump, and a waste water outlet, the sump being configured as a pump chamber for receiving a pump mechanism for pumping water from the sump through the waste water outlet.

[0017] By configuring the sump as a pump chamber, it is possible to fit a pump after the former has been installed without the need to have access below the base. Also, because such a sump can operate without a pump mechanism, either for a gravity drain, or when attached to another pump system in the discharge, it is only necessary to have one type of former for any installation.

[0018] The sump is preferably formed integrally with the base, although it can also be formed separately and attached prior to installation.

[0019] It is also preferred that a clamp is provided which surrounds the shower water inlet and by which the floor covering material can be clamped to the base, typically attaching directly to the sump/pump chamber.

[0020] The invention will now be described by way of examples, with reference to the accompanying drawings, in which:

Figure 1 shows a pump according to one embodiment of the invention;

Figure 2 shows an exploded view of the pump of Figure 1;

Figure 3 shows an underneath view of the pump of Figure 1;

Figure 4 shows the pump of Figure 1 installed in a shower tray;

Figure 5 shows a separated view of the pump, cover and shower tray of Figure 4.

Figure 6 shows a shower installation with a wet floor former according to one embodiment of the invention; and

Figure 7 shows a detailed view of the sump of Figure 6.

[0021] Referring now to the drawings, a pump according to one embodiment of the invention is shown in Fig 1, in exploded and part-cutaway view. The pump comprises a sump body 10 formed from a moulded plastic material and having an open-topped, shaped pump chamber 12 and an outlet 14 defined therein. The sump body 10 is formed with a flange 16 allowing it to be secured in a shower drain hole as will be described below. A top plate 17 is fixed over the pump chamber 12. The top plate 17 has a hole 19 formed in a central region thereof. A motor housing 18 is provided for fixing on top of the top plate 17 and above the base of the shower (not shown) and enclosing an electric motor 20 (together with an associated electrical controller 21) which drives an impeller 22 located in the pump chamber 12 by means of a drive shaft 24 passing from the motor 20 through the hole 19. A cover 26 sits over the housing 18. The cover 26 is provided with apertures 27 for allowing water to drain through into the pump through the hole 19 but to catch and filter out items such as hair which might otherwise block the pump or drain.

[0022] A non-return valve 28 is positioned in the outlet 14 to prevent water flowing back into the pump chamber 12 when the pump is not active. In the present case, the valve 28 is in the form of a flap which is formed integrally with a resilient gasket 30 positioned between the sump body 10 and top plate 17.

[0023] The motor 20 is a low voltage electrical motor and is connected to a power supply in the normal manner (not shown). Sensors (not shown) are also provided in the pump chamber 12 for detecting the presence of water. These sensors can be used to automatically activate the pump when sufficient water has flowed from the shower to cover the impeller 22, and to stop the pump when the water falls below this level for any reason. The sensors can be of a number of different forms, for example a sensor probe extending down into the pump chamber 12 to a predetermined height above the base thereof, or spaced electrodes in the pump chamber.

[0024] In use, the sump body 10 sits in the drain hole 31 of a shower tray 32 and secured thereto by means of three fixing lugs in mounting blocks 33 from below (screws or any other suitable form of fastening, or a ring nut may also be used). A gasket 34 can be provided to seal the join and prevent water leakage around the outside of the pump. The top plate 16, housing 18, motor 20 and impeller 22, and the cover 26 are connected as described above. The outlet 14 of the pump is connected to a waste pipe 36. It is particularly preferred that this pipe 36 be flexible in order to accommodate obstructions in the drainage path. The pipe 36 connects to a drain in the normal manner.

[0025] In an alternative construction, the sump body 10 is formed integrally with the shower tray 32, the remaining parts being connected as above.

[0026] A further embodiment of the invention has the motor mounted below the sump body 10 driving upwardly through the base thereof into the chamber 12. Such an arrangement is dependent on sufficient space being available to house the pump. This is not usually the case with normal electric motors. However, new designs of motor are

becoming available which have relatively low profiles which may allow such an arrangement to be used. Even with this arrangement, the characteristic of the invention remains, namely that the shower drains directly into the pump chamber, with all of the benefits discussed previously.

[0027] A shower installation including a wet floor former according to one embodiment of the invention is shown in Figures 6 and 7 and is formed in a corner of a room with the two adjoining walls 51, 52 being tiled and the shower head 53 being attached to the wall 51 in the normal manner. The base 54 is provided in the form of a wet floor former 55 with a waterproof covering 56 secured to its upper surface. A drain 57 is formed part way along one edge and close to the wall 52. The waterproof covering 56 is secured to the former 55 around the drain opening by means of a clamping ring 61 that is positioned on top of the covering and screwed into the base 55. The regions 58 of the base 54 around the drain 57 are sloped such that water naturally flows towards the drain 57. A sump 59 is formed integrally with the base 54 in the drain 57. A pump attaches to the sump in the manner described below.

[0028] A pump suitable for installation in a wet floor former as shown in Figures 6 and 7 can be as is described in relation to Figures 1-3 above.

[0029] The wet floor former 55 of the invention is installed by either providing a wet concrete layer into which the former is pushed, the concrete then being allowed to set; or by being fixed directly on top of timber floor joists. The waterproof covering 56 can then be secured in the normal manner. The outlet from the sump is connected to a waste water pipe in the normal manner. If the waste pipe is capable of draining under gravity, or alternatively already includes a pump, all that is required is to fit a cover to stop hair or other material from entering the sump and blocking the outlet. If no pump is fitted, and it becomes evident that one is required, either on original installation or thereafter, it is a relatively easy job to fit the pump mechanism into the sump to improve drainage.

[0030] Further changes can be made while staying within the scope of the invention.